

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

REC'D 01 APR 2005

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Applicant's or agent's file reference LU6075	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/13914	International filing date (day/month/year) 09.12.2003	Priority date (day/month/year) 10.12.2002
International Patent Classification (IPC) or both national classification and IPC C08F10/00		
Applicant BASELL POLYOLEFINE GMBH		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

I ☒ Basis of the opinion

II ☐ Priority

III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

IV ☐ Lack of unity of invention


V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

VI ☐ Certain documents cited

VII ☐ Certain defects in the international application

VIII ☐ Certain observations on the international application

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Date of submission of the demand 05.07.2004	Date of completion of this report 04.04.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Schmidt, H Telephone No. +31 70 340-2461



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP 03/13914

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-20 as originally filed

Claims, Numbers

1-9 received on 07.07.2004 with letter of 05.07.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ ~~furnished subsequently to this Authority in written form.~~
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

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**INTERNATIONAL PRELIMINARY
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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-9
	No: Claims	
Inventive step (IS)	Yes: Claims	1-9
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations

see separate sheet

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP 03/13914

Box I

1. The following documents are referred to in the present report; the numbering will be adhered to the entire procedure

D1 US-A-4442275
D2 WO-A-02/02652

Box V

2. Present claims 1-9 appear to be novel acc. Art. 33(2) PCT

2.1 D1 describes a support of silica/CrO₃ which is treated with Ti alkoxide in a protic medium (oxalic acid/glycol) (see example VI). The description (column 3, line 5-7) suggests that an addition of a Cr compound can be at the same time as the addition of the Ti compound. The water content is not disclosed in relation to the protic medium, but in the ratio to the Ti compound (1:1-250:1 or higher, see column 3, lines 55-68). According to the applicant, the water content in the example (example VI uses the same process as I) is more than 20%.

The examples of D1 are considered as state of the art being closest to the claimed subject matter. They differ hence in the water content and the fact that the Cr compound is added additionally to the suspension used in example VI. To arrive at present claim 1 a skilled man hence has to make several replacements of the features of the examples. Such replacements lead to a new combination of features. Claim 1 hence is regarded to be novel.

2.2 D2 discloses a supported titanized chromium catalyst for polyethylene; Ti tetraisopropylate is added in heptane/formic acid and Cr nitrate is added in methanol. However, the addition is not at the same time and the same solvent

3. Present claims 1-9 appear to be inventive acc. Art. 33(3) PCT

3.1 Closest prior art is D2

The distinguishing feature to claim 1 is that the Ti compound is not added in the same suspension as the Cr compound.

The technical effect arising from this difference is a higher productivity upon polymerisation as shown by example 3 and comparative example 3 (which corresponds

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**INTERNATIONAL PRELIMINARY
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to D2).

The problem to be solved is hence to design a process for preparing a catalyst with higher productivity.

The solution to this problem is to modify the process of D2 by adding the Ti and Cr compound at the same time.

There is no prior art available disclosing in which solvent both the Cr and Ti compound can be added. Moreover, it is surprising that the simultaneous addition also increases the productivity. Claim 1 is regarded to be inventive

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REF: 34 10 10
We claim:

1. A process for preparing supported, titanized chromium catalysts, which comprises the following steps:
 - A) bringing a support material into contact with a protic medium comprising a titanium compound and a chromium compound,
 - B) optionally removing the solvent,
 - C) optionally calcining the precatalyst obtained after step B) and
 - D) optionally activating the precatalyst obtained after step B) or C) in an oxygen-containing atmosphere at from 400°C to 1100°C.
2. A process as claimed in claim 1, wherein the support material is a silica gel.
3. A process as claimed in claim 1 or 2, wherein the chromium compound is an inorganic chromium compound.
4. A process as claimed in claim 3, wherein the inorganic chromium compound is chromium(III) nitrate nonahydrate.
5. A process as claimed in any of claims 1 to 4, wherein the titanium compound is titanium tetraisopropoxide, titanium tetra-n-butoxide or a mixture of these two titanium compounds.
6. A process as claimed in any of claims 1 to 5, wherein the protic medium is methanol.
7. A catalyst system obtainable by a process as claimed in any of claims 1 to 6.
8. A process for preparing polyolefins by polymerization or copolymerization of olefins in the presence of a catalyst system as claimed in claim 7.
9. A process as claimed in claim 8, wherein ethylene or a monomer mixture of ethylene and/or C₃-C₁₂-1-alkenes containing at least 50 mol% of ethylene is used as monomer(s) in the polymerization.